

**Notice of Allowability**

Application No.

10/824,497

Examiner

Pamela E. Perkins

Applicant(s)

ENDOU ET AL.

Art Unit

2822

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the filing of the amendment on 15 April 2004.
2. ☒ The allowed claim(s) is/are 1-8.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☒ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

### **DETAILED ACTION**

This office action is in response to the filing of the amendment on 27 November 2005 and the supplemental amendment on 14 December 2005. Claims 1-8 are pending.

#### ***Allowable Subject Matter***

Claims 1-8 are allowed.

#### ***Reasons for Allowance***

The following is an examiner's statement of reasons for allowance: prior art does not anticipate, teach, or suggest a method of manufacturing a silicon carbide semiconductor in which an electrode is formed in a contact hole in an insulating film on a semiconductor substrate formed from a silicon carbide where a metal film is formed in the contact hole and on the insulating film of the semiconductor substrate; chemically combining the metal film formed in the contact hole with a surface of the semiconductor substrate below the contact hole by subjecting the semiconductor substrate to a heat treatment to form an alloy film of silicon carbide and the metal film at the contact hole; and removing the metal film formed on the insulating film with an etching liquid for dissolving the metal.

For example, Tanimoto et al. (6,833,562/JP2003-243654) disclose a method of manufacturing a silicon carbide semiconductor in which an electrode is formed in a contact hole in an insulating film on a semiconductor substrate formed from a silicon

carbide where a metal film is formed in the contact hole and on the insulating film of the semiconductor substrate; and chemically combining the metal film formed in the contact hole with a surface of the semiconductor substrate below the contact hole by subjecting the semiconductor substrate to a heat treatment. However, Tanimoto et al. do not disclose, anticipate, teach, or suggest chemically combining the metal film formed in the contact hole with a surface of the semiconductor substrate below the contact hole by subjecting the semiconductor substrate to a heat treatment to form an alloy film of silicon carbide and the metal film at the contact hole; and removing the metal film formed on the insulating film with an etching liquid for dissolving the metal.

Tischler (5,442,200) discloses a method of manufacturing a silicon carbide semiconductor in which an electrode is formed in a contact hole in an insulating film on a semiconductor substrate formed from a silicon carbide where a metal film is formed in the contact hole and on the insulating film of the semiconductor substrate; subjecting the semiconductor substrate to a heat treatment; and removing the metal film formed on the insulating film with an etching liquid for dissolving the metal. However, Tischler does not disclose, anticipate, teach or suggest chemically combining the metal film formed in the contact hole with a surface of the semiconductor substrate below the contact hole by subjecting the semiconductor substrate to a heat treatment to form an alloy film of silicon carbide and the metal film at the contact hole.

The prior art made of record in this action does not anticipate, teach, or suggest chemically combining the metal film formed in the contact hole with a surface of the semiconductor substrate below the contact hole by subjecting the semiconductor

substrate to a heat treatment to form an alloy film of silicon carbide and the metal film at the contact hole; and removing the metal film formed on the insulating film with an etching liquid for dissolving the metal.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ota et al. (6,110,813) and Tanimoto (2005/0205941) both disclose chemically combining the metal film formed in the contact hole with a surface of the semiconductor substrate below the contact hole by subjecting the semiconductor substrate to a heat treatment to form an alloy film of silicon carbide and the metal film at the contact hole.

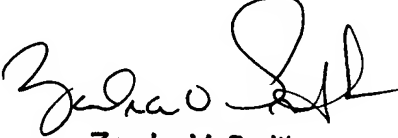
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pamela E. Perkins whose telephone number is (571) 272-1840. The examiner can normally be reached on Monday thru Friday, 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PEP

  
Zandra V. Smith  
Supervisory Patent Examiner  
24 Feb. 2006